Professional Development School Triads Inquiring About Student Work in Elementary Mathematics

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ABSTRACT: This article reports on a case of cross-role triads (mentor, intern, and supervisor) in a professional development school (PDS) setting engaged in the process of looking at student work in elementary mathematics over time. The study represents a significant effort to understand what inquiry-oriented behavior looks like in this context. By recognizing and understanding these behaviors, new insights are gained about the development of an inquiry stance. The primary source of data was audio-recorded triad meetings, which were analyzed for observable inquiry-oriented behaviors in practice. It was found that each triad exhibited distinctive patterns of talk about mathematical knowledge, student understandings, and instructional practice. Moreover, each triad's talk also displayed a unique orientation toward inquiry. The findings from this study have implications for developing pre-service university-based training experiences and providing recommendations to school district leaders regarding meaningful professional development for collaborative groups examining student work.

NAPDS Essentials Addressed: #4/A shared commitment to innovative and reflective practice by all participants; #5/ Engagement in and public sharing of the results of deliberate investigations of practice by respective participants; #7/A structure that allows all participants a forum for ongoing governance, reflection, and collaboration.

Introduction

> If teachers are to be effective, they must work in settings where they can use what they know—where, for example, they can come to know students and families well; work with other teachers to provide a coherent, well-grounded curriculum; evaluate and guide student progress using information-rich assessments; and use texts and materials that support thoughtful learning. (Bransford, Darling-Hammond, & LePage, 2005, p. 4)

These are ambitious and noble goals for those responsible for preparing teachers to work in schools today in the United States. Unfortunately, given the current demands placed upon teachers, accomplishing these goals has become tremendously challenging. In the current era of accountability and increased pressure to raise student achievement scores, teachers find themselves struggling to find the energy, motivation, and time to be reflective practitioners. Given the task of addressing district requirements, state standards, and now Common Core State Standards (National Governors Association and Council of Chief State School Officers, 2010), many teachers feel that there is little time left to practice being "life-long learners who raise questions and research their practice across the professional career" (Cochran-Smith, Barnatt, Friedman, & Pine, 2009). Now more than ever, it is important to consider ways in which teachers can be encouraged to come together in collaborative settings to reflect on their teaching in meaningful ways and make important decisions about their practice.

The study reported here looked at how school-university partnerships play a "role in structuring these learning communities to increase learning and development for more teachers, prospective and practicing" (Snow-Gerono, 2005, p. 253). In this particular case, the learning community was a professional development school (PDS) triad: mentor teacher, intern, and supervisor or coach. The triads worked together extensively in a PDS setting throughout the 2012-2013 school year.

The purpose of this study was to look at the substance of the conversations of three PDS triads engaged in the process of looking at student work in elementary mathematics over time. Each conversation took place within a different PDS triad within one school district, each at a different grade level and at a different elementary school. We were interested in examining the ways in which the triad members acquired knowledge about their practice as they discussed student work. Was there a focus on student understanding rather than skill development? Did the triad members share their own mathematical knowledge? How did they talk about the types of instructional practices that were represented in the student work? Was there evidence that their talk was oriented toward inquiry?

The findings of this study have implications for understanding how collaborative inquiry groups, such as PDS triads, can provide a venue in which a stance toward inquiry can develop. The study describes both productive and disconnected

conversations within triads and across triad roles. We offer evidence to support claims about the impact of the conversations on knowledge acquired and ultimately on the teaching practice of the PDS triads. It is our hope that this research will provide ideas to school leaders and pre-service teacher educators for strengthening the work of collaborative groups such as PDS triads toward developing a stance toward inquiry.

Theoretical Framework

Nelson, Slavit, and Deuel (2012) developed two frameworks with which to examine the dimensions of an inquiry stance in a professional learning community (PLC). One of their frameworks looked specifically at the nature of dialogue in PLCs when discussing student work. Their research defined behaviors such as how questions are asked, how evidence is characterized, and what types of claims are made. This framework was adapted and used to characterize the PDS triad conversations in this study (see Appendix A). Furthermore, Nelson et al. (2012) believe that there is a clear distinction between an inquiry *process* and an inquiry *stance*:

> We make a clear distinction between inquiry as a cyclic *process* of planning, implementing, collecting, and analyzing data and inquiry as the collective *stance* of a group of teachers. We use stance in relation to the habits of mind or ways of being that underpin teachers' group processes. (p. 10)

We share this belief and focused our work on the cyclic *process* of inquiry. We believe that it is important to study the planning, implementing, collecting, and analyzing of data that defines the inquiry *process*. From this evidence, assumptions can be made about the development of an inquiry stance. These noticeable behaviors, identified as components of the inquiry *process,* are at the heart of this study.

We were also interested in the type of knowledge acquired by PDS triads when analyzing student work. We drew on the research of Cochran-Smith and Lytle (1999) who proposed three significantly different conceptions of "teacher learning based on an understanding of the relationship of knowledge and practice" (p. 253). They described these three different conceptions as knowledge *for* practice, knowledge *in* practice, and knowledge *of* practice. As we examined the triad conversations, we looked for knowledge *for* practice by identifying instances when the triad drew upon their own knowledge base, knowledge that may have been acquired outside the classroom. We looked for evidence of knowledge *in* practice, or ideas that could be defined as authentic learning opportunities embedded in practice. And finally, we hoped to find evidence of knowledge *of* practice. Cochran-Smith and Lytle (1999) argue that knowledge *of* practice is the stepping-stone toward the development of an inquiry stance. This phase of knowledge acquisition is characterized by inquiry as a producer of knowledge, a way to reflect on and improve practice, and a catalyst for teacher learning.

Methodology and Methods

This qualitative research study used case study methodology as an investigative tool to analyze the conversations of three PDS triads that took place within a collaborative study cycle (see Appendix B). More specifically, this might be called an instrumental case study, where the "case is examined mainly to provide insight into an issue" (Stake, 2000, p. 137). In this instance, the issue was the search for knowledge *for*, *in*, and *of* practice (Cochran-Smith & Lytle, 1999) in the conversations of PDS triads who were collaboratively discussing student work in elementary mathematics. We studied evidence of these three types of knowledge, examining the role they played in developing inquiry as a cyclic *process*. Hence, the main contribution of this article was the understanding of behaviors in practice that may foster the development of an inquiry stance within a PDS triad.

This study was a pilot for future research that would look at PDS triads across multiple study cycles over time. This pilot study examined student work that was collected to fulfill the requirements of an assignment for the PDS intern's elementary mathematics methods course. The assignment required the triad to meet two times, one time to identify a student to study, and another to discuss the results of the student work. The audio recording of the second meeting of the study cycle from each of three PDS triads provided the primary source of data for this study.

Two of the four authors of this article were the co-instructors of the elementary mathematics methods course, another was the PDS partnership director, and the fourth was a district instructional coach who was a participant in the study. The authors felt strongly that in future studies, it would be necessary to examine multiple study cycles to increase the validity of the conclusions. The important work of this pilot group, however, set the stage for the subsequent dissertation study.

Context of Study

The site of this study was a PDS partnership between a large research university in the northeast U.S. and the school district surrounding its campus. The school district had a total enrollment of over 7,000 students and a faculty/staff of approximately 1,325. One of the hallmarks of this partnership was its focus on inquiry.

During the fall semester of 2012, interns in this PDS partnership were enrolled in four methods courses, held in district classrooms and co-taught by university and district personnel. In the methods courses, interns were encouraged to engage in thoughtful reflection as a means of developing a future teaching platform that reflected a stance toward inquiry. Mentor teachers and others, in both the district and the university, were also encouraged to work collaboratively to identify and address wonderings through inquiry and share the results publicly. Grounded in this milieu, the site afforded an ideal context in which to explore the growth and development of an inquiry stance in practice.

Participants

Each PDS triad was composed of a mentor teacher, his/her intern, and the supervisor or instructional coach. In the 2012-2013 school year, there were 60 triads placed in K-6 classrooms throughout the school district. From these sixty triads, participants in this study were selected using purposeful sampling as described by Maxwell (2013): "In this strategy, particular settings, persons, or activities are selected deliberately to provide information that is particularly relevant to your questions and goals, and that can't be gotten as well from other choices" (p. 97). The three mentors who were chosen as participants for this study were known to have an understanding of the importance of inquiry as a process in practice. The intern and supervisor or coach placed with each of the three mentors comprised the three triads in this study. The three triads represented three different grade levels and three different school buildings (see Appendix C). Hereafter, the triads will be referred to as Triad T2, Triad T3, and Triad T6 to indicate the grade level.

The single common feature across triads was that the interns were all white females and fourth-year university seniors. The mentors varied in gender, years of teaching experience (7-24 years), and experience/roles held in the PDS. Two mentors were white females; one was a white male. There were two white male supervisors and one white female instructional coach. The backgrounds of the supervisor or coach (S/C) group also varied widely; one was a retired teacher, another a university faculty member, the third was employed by the school district at the time of the study. All had been PDS methods instructors, albeit for a different number of years and in various content areas. Moreover, in the S/C group, two members had previously been mentor teachers and one had not.

Data Collection

Triad conversations during the two distinct meetings of a study cycle were audio recorded. During the first meeting, each triad identified a student whose understanding of a specific mathematical concept was puzzling. Then, the triad identified 2-3 pieces of student work to administer and evaluate (data exploration). Following the administration of the assessment tools (data collection), the triad met for a second time to review the results, discuss interpretations, and determine a student plan (data analysis). The focus of the present study was on the second meeting during which the triads reviewed assessment results, made interpretations, and designed a student plan.

Data Analysis

During the analysis process, the contributions of each of the three participants—mentor, intern, and supervisor or coach—within each of the PDS triads were examined for evidence of inquiry-oriented behavior. Consistent with the approach of Nelson et al. (2012), the analysis focused on characterizing a group stance toward looking at student work. In order to capture the collaborative nature of the conversations, individual exchanges were noted, but the focus of analysis was on the stance that was ultimately evidenced by the group (PDS triad). The "habits of mind or ways of being that underpin teachers' group processes" (Maxwell, 2013, p. 4) were the focus of the analysis of the PDS conversations.

Audio recordings of each triad conversation were listened to, transcribed, and read multiple times. As recommended by Maxwell (2013), we wrote notes about initial thoughts while reading the transcripts. In the initial pass through the transcripts, four main themes or codes were determined: mathematical knowledge of individual triad members (MK), instructional practices (IP), student understandings (SU) and instances of inquiry (INQ). Instances of inquiry were noted in correlation with one of the three codes: MK, IP, or SU. The coded dialogue for the combined individual members within the triad was then sorted according to these four themes. Patterns that emerged within each triad were then identified and described as a group stance. Concurrently, a codebook was established with descriptors for each category (see Appendix D)

Following the first coding session, a memo was written for each of the four main themes. In the next pass through the data, instances from each of the three triads were then compared to one another by each theme, noticing where similarities and differences emerged. Codebook descriptors were further defined and a memo was written about each of the three triads.

In the third pass, the themes were examined across each triad member. During this part of the analysis process, the frequency of coded instances by individuals was noted and compared across triads. A spreadsheet was created and coded instances were organized by theme. This document was used to create a chart that organized each theme by triad and by participant. The codebook was further refined and final decisions were made regarding the wording used to describe each theme.

Finally, the data were sorted into two organizational formats. In the first format, the themes were assigned a color and format, (MK = blue, IP = purple, SU = green, INQ = bolded/underlined). Next, the themes for each triad were listed in sequence and placed in a column. The final design consisted of three side-by-side columns of the triad themes in sequence. In this format, broad patterns were more easily apparent when reviewing the coded data (see Appendix E).

The second coded organizational format was created using three strips of adding machine tape, one for each triad. The purpose of this format was to clearly delineate how the coded instances played out for each triad member. For example, the tape was divided into three rows. In the top row, the coded instances of the intern were recorded; in the second row, the coded instances of the mentors were recorded; and in the bottom row, the supervisor or coach's coded instances were recorded. Each vertical column represented one moment in time

with only one coded instance per column. In this way, the sequence and the interaction among the triad members was clearly depicted (see Appendix F).

Results

The transcript of each meeting was analyzed in three sections: beginning, middle, and end. Patterns of themes were described that emerged in each portion of the meeting. We paid particular attention to how a comment by one triad member might have evoked a particular type of response from another triad member. After analyzing the coded data from each individual triad, we then discussed similarities and differences among the triads across the three roles, i.e. mentor teacher, intern, and supervisor or coach.

As mentioned earlier, each series of meetings represented the interns' work required for an assignment for their elementary mathematics methods course. Therefore, it was perhaps not surprising that the intern would lead off the conversation by sharing the student work she had administered and evaluated. Likewise, given that one of the goals of the study cycle was to design an instructional plan for the student, it was also not surprising that a discussion of possible future instructional strategies took place. And so, with this framework in place, the focus of this study was to examine the intricacies that defined the substance of the conversations. How did the triad members interact with each other? In what ways did they work to address their goals throughout the discussion? Was there evidence of inquiry in their talk? What did these behaviors look like in practice? In other words, how did these three PDS triads (intern, mentor, and supervisor or coach) inquire into and talk about student work in elementary mathematics?

Group Stance

Triad T2. Triad T2's conversation was 21.22 minutes long. This triad might be described as the "collaborative" triad, based on evidence that all three triad members routinely participated and made significant contributions to the discussion throughout the meeting. The discussion began as expected with the intern sharing results from the student work. Then, all the triad members joined the conversation and contributed to the discussion. Finally, decisions were made about future instructional plans for the focus student. Notably, this triad's conversation had few instances where they used their own mathematical knowledge to contribute to the discussion. Instead, decisions were made primarily by considering the effectiveness of the instructional practices and by taking into account what the student understood about the mathematics.

The Triad T2 intern was the primary contributor to the conversation in the beginning of the meeting during which time she described the results of the student assessments. Embedded in these exchanges was evidence of all three major themes: the intern's mathematical knowledge, instructional practices that were utilized, and what the student understood about the mathematics. During this beginning section of the conversation, the instructional coach occasionally posed an inquiry-oriented question about one or more of three major themes. The majority of her questions, however, addressed wonderings about the student's understanding. Most of this dialogue took place between the intern and the instructional coach; the mentor teacher did not participate in the beginning portion of the meeting.

In the middle section of the meeting, the mentor teacher joined the conversation, interacting primarily with the intern. Together they discussed instructional practices and student understandings, but not necessarily in an inquiring way. They stated what they noticed in the student work and asked questions that were more logical or technical in nature. Notably, they made limited comments about the student work that revealed their own mathematical knowledge. The instructional coach did not play a major role during this part of the dialogue.

In the final part of the meeting, the conversation almost exclusively focused on instructional practices. A significant number of inquiring comments about past and future instructional practices were made by all three triad members. The dialogue flowed back and forth among all participants, with active engagement from all triad members. Interestingly, as Triad T2 made decisions about next steps for the student, they did not refer back to student understandings that had been discussed previously.

Of particular note, throughout the majority of the meeting, the instructional coach made inquiring comments at least twice as often as the intern or the mentor. However, in the final minutes of the meeting, inquiring comments become more balanced among all three triad members, representing evidence of growth toward a more collaborative interaction. For example, in the following exchange, the mentor, intern, and instructional coach all made inquiring remarks as they considered the use of an alternate assessment strategy. In this exchange, all members of Triad T2 were engaged, building on previous comments and contributing ideas of their own.

> **Mentor**: I also wonder about multiple choice with him, if he was given options, if it involved circling an answer. We can make these assessments with multiple-choice. There is a multiple-choice question. It would be interesting to see and that might be something that might be fun to try with him and see how does a multiple choice because he does usually have the answer, would that make it any easier for him?
> **Coach**: Yea. Maybe you could have some of the questions be multiple choice and only one of them be a more open-ended response for him.
> **Intern**: And then even compare the difference between like maybe how long it takes him to get through the multiple choice and then how long it takes him to do that one or two problems that were more open-ended and then that would be a really good indicator of it's more the writing than it is figuring out the problem.

As the Triad T2 conversation developed, the participants became more responsive to each other. In the end, this collaborative team showed deep concern and genuine interest in the student's work. Moreover, they demonstrated a desire to take a collective approach to examining and analyzing the student work.

Triad T3. Triad T3 might be described as the "mentor-model" triad. Although all three triad members participated in the conversation, it was the mentor who spoke the most, was exceptionally inquiring, shared a wealth of her own mathematical knowledge, and enthusiastically led the conversation.

Similar to Triad T2, Triad T3 also began with the intern sharing the results of the student work. The mentor teacher, however, stepped in to take an active role early in the conversation. It could be said that she was the primary contributor to the conversation throughout the entire triad meeting. The mentor regularly supported her comments with her own mathematical knowledge and often posed her remarks in an inquiring fashion.

In fact, all three members of Triad T3 posed a majority of their comments in an inquiring manner. This could have resulted from the numerous inquiring comments modeled by the mentor. Moreover, the three themes (MK, IP, SU) remained present throughout the entire conversation. It was often the case that an inquiring comment about a student understanding was followed by a connection to mathematical knowledge, ending with an idea for an instructional practice. In a number of instances, the mentor talked through this process on her own. In the following example, the mentor teacher reflected on the student's work and wondered how the student understood the mathematics. She posed ideas about how the student might be thinking and offered suggestions for future instructional strategies.

> **Mentor**: Uhm hum, which surprises me because she and I had an adding up talk and she seemed to be understanding. I think her problem is she's so conditioned to think, uhm, like you presented all the problems numerically and I guess if you would have presented a word problem, she would have done the same thing. She's conditioned to think that first problem says 265 – 47 = , so then you have to do subtraction because it says subtraction. That you couldn't possibly do 47 adding up to 265, which is not the most efficient strategy, I mean, she doesn't even have the ability, I don't think, and maybe this is something you could ask her. Say, well 47 is close to what really big landmark number? 50! 265 – 50. You could do that one in your head. Then you took away 3 too many. I don't know if she has any flexibility in her numbers.

There were, however, a number of exchanges in which all triad members interacted with each other. The following interaction took place in the middle section of the meeting and showed how the intern, mentor, and supervisor all weighed in on the idea of introducing a strategy that was similar to the algorithm, but that would provide a reasonable alternative for the student.

> **Mentor**: I would say for addition that's easier, cuz you can do adding by place horizontally. You add the hundreds, you add the tens, you add the ones. It's pretty much an algorithm in horizontal form. For subtraction, not really, but because we spent a month flipping subtraction to missing addition numbers problems, she and I remember working with her a couple different days on that, so she might actually, with a little bit more practice, might become more proficient. She's already had a start on it.
> **Intern**: Yea, and I think it would be something beneficial to the whole class to just revisit some of those once we get back into addition and subtraction.
> **Supervisor**: Certainly wouldn't hurt.
> **Intern**: Maybe not as extreme as we did the first time. We spent a lot of time [practicing those concepts].

In the final part of the meeting, the mentor continued as the driving force, but as next steps were decided for the student, the intern and supervisor also shared their ideas and opinions in the last few, yet important, minutes of the discussion. The triad felt that it would be useful for the student to have a chance to "play" with the math, to have some individualized homework, and to think about real life mathematical situations such as sharing pretzels with all the students in the classroom. In the final minutes of the conversation, the voices of all the triad members were heard and all the major themes remained present in the dialogue.

Triad T6. The Triad T6 meeting was the shortest of the three PDS triads. This relatively brief conversation might be described as a "quick fix" discussion. Even with encouragement from the supervisor, the mentor and intern made limited remarks about what the student understood mathematically. Instead, their focus was on poor work habits that seemed to interfere with the student's learning. The "quick fix" was to collect data that represented evidence of the poor work habits, share it with the student, and hope that his behavior would change as a result.

The intern was the primary contributor in the beginning of the conversation. The mentor posed several brief questions about the mathematical content of the student work. The intern responded with feedback about the instructional practices that had been used and offered tentative claims about the student understanding that was reflected in the work. Similar to Triad T2, Triad T3 revealed little about their own mathematical knowledge in the comments they made about the student work. The supervisor listened but did not comment in the beginning section of the meeting.

In the middle part of the meeting, the supervisor began with a series of inquiring comments, or wonderings about what the student understood about the mathematics. This prompted

the intern to explore additional ideas about what the student might know. This interaction was almost exclusively between the intern and the supervisor; the mentor made only an occasional brief comment during this part of the meeting.

In the beginning and middle portions of the triad meeting, the intern intermittently shifted the conversation from a discussion about the mathematical understandings of the student to a focus on his poor work habits. It appeared that she felt the student's work habits played a significant role in the poor results of the student work. The mentor supported those comments, but the supervisor continued to attempt to shift the conversation to a discussion about the student's understanding of the mathematics. The following example illustrates how the mentor and intern focused on the student's work habits, while the supervisor persisted in asking about the mathematical understandings of the student.

> **Mentor**: Yea. It's off just because he wasn't paying attention, right? You were saying with the. . .he was off with his Daily Depositor?
> **Intern**: Yeah, yeah. The last Calendar Math—I noticed he gets behind especially on Daily Depositor because he tries to rush through the others as we're going along the Daily Pattern or Daily Variable to try and get ahead.
> **Supervisor**: So how can he be so far off on that one and then so close on this one?

In the final minutes of the meeting, the intern did not make substantial contributions to the discussion. During this time, the mentor suggested that the intern collect and share data with the student showing that he was not paying attention during class. The mentor felt that perhaps if the student was made aware of his off-task behavior, it would motivate him to change his behavior, and ultimately help him become a better student. During this final part of the meeting, the supervisor continued to inquire about the student's understandings. For example, originally the triad thought that the student did not know his basic facts. However, one piece of student work indicated that he actually did know his basic facts, that perhaps he simply needed a bit more time to think about them. As the supervisor attempted to bring that idea to the fore of the conversation, the mentor and, to some extent the intern, continued to focus instead on ways to improve his work habits (i.e., carelessness, rushing). There was never open disagreement among the triad members; they each simply had their own idea about where the problem with this student lay and what solutions would be the most effective.

Contributions of Members of the Triad

Interns: T2, T3, T6. There were similarities and differences in the participation of the three interns. According to the study cycle, it was the intern's responsibility to administer, evaluate, and bring the results of the student work to the meeting. Accordingly, all three interns opened the conversation by sharing results of the student work. In T2 and T6, the intern's review of the student work was the primary focus of the conversation in the beginning section of the meeting. Conversely, the T3 intern offered only an initial brief comment to begin the discussion.

Even though the interns were the least experienced member of the triads, the T2 and T3 interns remained active participants throughout the meeting. Conversely, the T6 intern's participation declined in the final part of the conversation when decisions were being made about an instructional plan. Perhaps she lacked confidence in the decision-making process. She may have felt that a decision had already been made, or that her opinion was not considered to be worthy.

The frequency of intern comments also varied. For example, the T2 intern spoke more than both her mentor and the coach combined. The T3 intern contributed less than the mentor, but significantly more than the T3 supervisor. The T6 intern's participation was similar to the other members in her triad except at the end of the meeting when she stepped out of the conversation.

Mentors: T2, T3, T6. The mentor participation patterns were startlingly different across the three triads. The differences in their participation is most easily visualized along a continuum from "more involved" to "less involved" (see Appendix G).

There were several noticeable patterns in the participation of the Triad T2 mentor. First, she listened without participating for the first third of the conversation. When she did begin to contribute, the majority of her comments were about instructional practices. It was at this point that there was active and balanced engagement among all triad members. Finally, the Triad T2 mentor made the fewest inquiring comments, none of which were about her own mathematical knowledge. Overall, the Triad T2 mentor was a good listener and elicited a collaborative stance from the group when she was part of the conversation. She did not, however, express deep wonderings about the mathematics in the student work. The T2 mentor was placed mid-way on the involvement continuum.

The Triad T3 mentor was the primary contributor to the conversation almost from the first comment of the meeting. She was very invested in the discussion, posed numerous inquiring comments, and contributed many examples of her own mathematical knowledge that informed the triad's instructional decisions. The frequency of her comments was at least twice that of the other triad members and consistently addressed all three themes: MK, IP, and SU. Moreover, her inquiring comments across the themes were noticed almost three times as often as the other triad members. Her participation patterns placed her on the "more involved" end of the continuum. She was directive, almost playing the "expert" role, but at the same time, welcomed and responded to comments from the intern and supervisor when they shared a remark.

The T6 mentor was categorized as "less involved." His participation was infrequent except during the last 1-2 minutes of the meeting. At that time, he brought closure to the conversation by suggesting that the student's work habits be

monitored and recorded. He felt that by sharing this information with the student, it would begin to effectively address the student's problem areas. During this discussion, his comments were mostly task-oriented. Although his participation was limited, he was influential in maintaining the focus on the student's work habits. His participation might be described as a "less involved" approach in terms of deeply and thoughtfully exploring the student work. Instead, he took a direct and objective approach to decision making.

Supervisor or Coach: T2, T3, T6. The third member of the triad was either the intern's university supervisor, or a district-employed instructional coach. In this study, there were two supervisors (T3 and T6) and one instructional coach (T2).

The Triad T2 coach and the Triad T6 supervisor played similar roles. Both offered the most inquiring comments to the conversation—at least 2-3 times as many as the intern or the mentor in their respective triads. They displayed consistent evidence of playing a supportive role, providing suggestions for alternative avenues to explore throughout the meeting. Neither was overbearing, nor did they act as "the expert," but instead they simply remained engaged, thoughtfully contributing to the conversation. On the other hand, the Triad T3 supervisor took a more passive, yet attentive stance. He contributed when appropriate, but did not necessarily play an active or significant role.

Discussion

The purpose of this study was to understand how a PDS triad inquires into and talks about student work in elementary mathematics. In discussing the results, we focus first on what type of knowledge is represented (*for*, *in*, or *of*) in each theme and how the interaction of the themes possibly suggested evidence of inquiry-oriented behavior.

We observed knowledge *for* and *in* practice throughout all of the meetings. References to the triad's mathematical knowledge often represented knowledge *for* practice (knowledge acquired by the triad members from outside the classroom). Student understanding represented knowledge *in* practice and was based on authentic experiences from the classroom. Discussions about instructional practices often combined both knowledge *for* practice and knowledge *in* practice. Comments about mathematical knowledge, student understandings, and instructional practices, stated both directly or in an inquiring way, shaped and defined the inquiry *process* that took place within each triad meeting.

Triad T2's inquiry process in practice was described as collaborative, with balanced participation among the mentor, intern, and supervisor. Their discussion focused primarily on student understandings and instructional practices. There was limited talk about the triad's own mathematical knowledge. The instructional coach was the primary contributor of inquiry-oriented comments.

Triad T3's inquiry process in practice was described as a model that was driven by the mentor. As a result of this direct modeling, there was evidence of inquiring comments from all three triad members, albeit less frequently from the intern and supervisor. In the end, T3 collaboratively agreed on a set of instructional plans to address the mathematical needs of their student.

And finally, Triad T6's inquiry process in practice was described as a "quick fix" approach. The data revealed task-oriented concerns by the mentor and intern, while the supervisor never ceased attempting to deepen the discussion by suggesting that they address further wonderings about the data from the student work.

As stated earlier, an inquiry *process* is not the same as an inquiry *stance*. In light of the belief that a disposition or stance develops over time, it only stands to reason that evidence of an inquiry stance was not discernable from this brief study. In order to begin to explore the development of an inquiry stance, a search for patterns of behavior across multiple study cycles are needed that point to a disposition, or a way of being within a PDS triad. Over time, patterns that were not evident when examining a single study cycle, may begin to emerge.

Moreover, there was significant diversity in the roles played by triad members. For example, whereas one mentor dominated the discussion, another took more of a "hands-off" approach. To understand these differences, it will be helpful in future research to interview each triad member to gain a perspective on his/her participation in the conversations. Perhaps another triad member or an extenuating circumstance that was not obvious in the data influenced a member's participation. Did all the triad members interpret the task in the same manner? Would they be in agreement about the way in which their comments were characterized? It would be essential to do member checks to clarify the answers to these and other important questions that arise.

In spite of the differences among the triad members, all three triads had relatively productive conversations. They reviewed student work, determined what students seemed to understand, discussed instructional practices—past and future—and, in most cases, shared some of their own mathematical knowledge. Providing opportunities for educators to come together in collaborative groups, such as professional development school triads, is an important first step in fostering the development of an inquiry stance. These groups experience the power of taking part in an inquiry process that may evolve into a group disposition, a habit of mind or an inquiry stance, when the process is sustained over time.

Although there is a growing field of research about using student work to initiate these conversations, the field is only in its infancy and remains underdeveloped. The present research contributes to the literature by providing a detailed analysis of an alternate way for teachers to make data-based instructional decisions. Looking collaboratively at authentic student work as a source of evidence can provide a welcome option for educators to measure their students' understanding, make instructional decisions, and learn from classroom practice. The

findings from this study have implications for developing pre-service university-based training experiences and providing recommendations to school district leaders regarding meaningful professional development for collaborative groups examining student work. SUP

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